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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,794	10/23/2003	Ke Liu	C-2990HyS	7156
7590	10/19/2004		EXAMINER NGUYEN, TU MINH	
M. P. Williams 210 Main Street Manchester, CT 06040			ART UNIT 3748	PAPER NUMBER

DATE MAILED: 10/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/691,794

Applicant(s)

LIU ET AL.

Examiner

Tu M. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 102303.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Kirwan et al. (U.S. Patent 6,655,130).

As shown in Figure 1, Kirwan et al., in an internal combustion engine system (20) which operates on fuel and which has an auxiliary system (24) which intermittently uses an internally generated mixture including hydrogen and carbon monoxide ("syngas", hereinafter), disclose a method comprising:

- generating in a reformer (12) at least an amount of syngas adequate for the auxiliary system;
- periodically applying the syngas to the auxiliary system (24) in the adequate amount during first periods of time interspersed with second periods of time (during accelerated exhaust catalyst (24) heating, syngas is applied to the catalyst for a period of time (lines 19-24 and lines 42-45 of column 5)); and

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- during the second periods of time, (a) reducing the amount of the syngas generated so as to generate no more than a small fraction of the adequate amount of syngas, and (b) diverting the syngas to a fuel inlet of the engine (during higher loads, syngas is supplied at smaller amounts to the engine (lines 37-42 of column 5)).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bromberg et al. (U.S. Patent 6,560,958) in view of Kirwan et al.

Re claims 2 and 3, as shown in Figure 5, Bromberg et al. disclose a method and an apparatus for generating a mixture including hydrogen and carbon monoxide (lines 63-64 of column 1) ("syngas", hereinafter), the apparatus comprising:

- an oxides-of-nitrogen ("NOx" hereinafter) trap assembly (32) having an adsorption material which is periodically regenerated with syngas;
- an internal combustion engine system (26) which operates on fuel and provides exhaust having NOx therein to the NOx trap assembly;
- first means (12) for generating syngas from the exhaust and the fuel in an amount effective to regenerate the adsorption material in the NOx trap assembly;

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- second means (valve means not numbered but clearly shown) for periodically applying at least the effective amount of the syngas to the NOx trap assembly for first periods of time (regeneration of NOx trap) on the order of 5-10 seconds long (lines 56-62 of column 3), interspersed with second periods of time (non-regeneration of NOx trap); and

- third means (a controller not shown but obviously must have) for altering the operation of either the first means or the second means during the second periods by diverting the syngas from the NOx trap assembly to an inlet of the engine (lines 45-52 of column 4) .

Bromberg et al., however, fail to disclose that the second periods of time are about 8-20 times longer than the first periods of time; and that during the second periods of time, an amount of fuel and exhaust gas used to regenerate the syngas is reduced so as to generate no more than a small fraction of the effective amount of syngas.

Bromberg et al. disclose the claimed invention except for specifying an optimum range of non-regeneration time of NOx trap of about 8-20 times longer than a regeneration time of NOx trap. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide specific optimum ranges of non-regeneration time of NOx trap, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

As shown in Figure 1, Kirwan et al. teach a system to supply a syngas (18a, 18b) to a catalyst (24) and to an engine (20), in which the syngas is supplied to the catalyst during a first period of time (accelerated catalyst heating). During a second period of time (higher engine loads), the engine is run with a blend of gasoline and syngas so as to maintain desired engine

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torque requirement (lines 40-43 of column 5). As indicated on lines 38-40, Kirwan et al. further teach that syngas displaces air to the engine and thus decreases maximum engine power.

Therefore, as the engine load becomes higher, an amount of syngas supplied to the engine in Kirwan et al. is reduced. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Kirwan et al. in the method and apparatus of Bromberg et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bromberg et al. in view of Kirwan et al. as applied to claim 3 above, in view of official notice.

The apparatus of Bromberg et al. discloses the invention as cited above, however, fails to disclose that the adsorption material in the NO_x trap assembly comprises barium carbonate.

It is well known to those with ordinary skill in the art that a typical NO_x trap contains at least a metal such as barium in the alkali or alkaline earth metal groups as an NO_x adsorption material. Therefore, such disclosure by Bromberg et al. is notoriously well known in the art so as to be proper for official notice.

Prior Art

6. The IDS (PTO-1449) filed on October 23, 2003 has been considered. An initialized copy is attached hereto.

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of four patents and two patent applications: Kruttsch et al. (U.S. Patent 5,921,076), Smith et al. (U.S. Patent 5,947,063), Murphy et al. (U.S. Patent 6,122,909),

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Bromberg et al. (U.S. Patent 6,718,753), Kramer et al. (U.S. Patent Application 2004/0020188), and Taylor et al. (U.S. Patent Application 2004/0020447) further disclose a state of the art.

Communication

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (703) 308-2833 or (571) 272-4862 to be effective on November 24, 2004.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (703) 308-2623 or (571) 272-4859 to be effective on November 24, 2004. The fax phone number for this group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-1148.

Tu M. Nguyen

TMN

October 15, 2004

Tu M. Nguyen

Patent Examiner

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